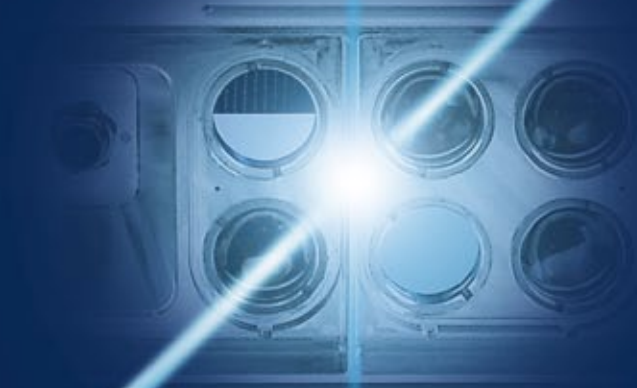


Lufft MARWIS-UMB

Mobil Advanced Road Weather Information Sensor



www.lufft.com/wondermadeingermany



Professional Mobile Weather Data Recording.



Forget black holes in your weather forecast.

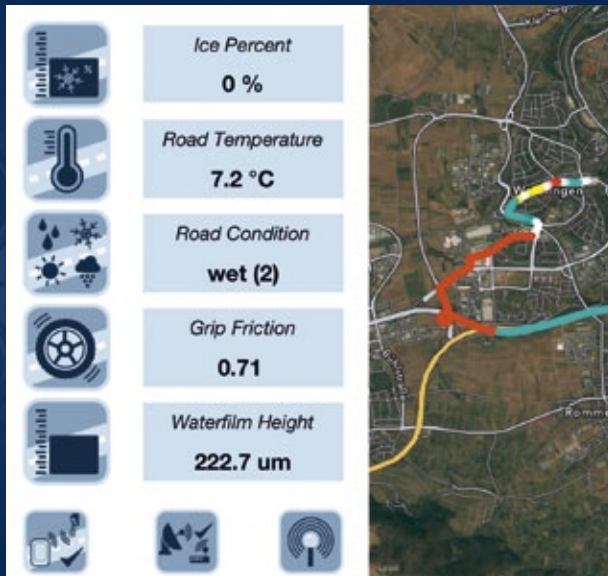
For which locations is the current weather forecast not sufficiently accurate? Mobile weather sensors help to record reliable measurement data in real time – anywhere, any time. For a better forecast in a mobile world.

You waste too much.

Too much or too little?
Better the optimal amount:
The sensor relays microclimatic measurements in real time and records all relevant environmental measurement data direct to the controller in the gritting vehicle.



100 measurements per second.



MARWIS converts your vehicle fleets into rapid response weather stations.

How soon will I arrive at my destination under the current weather conditions? Every navigation system requires reliable weather data in order to reliably calculate travel time.

Away from single point information to specific, route-related weather data.

MARWIS makes weather networks mobile.

The same real time information in the winter maintenance service for both mobile personnel and control center – for operational planning purposes. Optimize routes and avoid unnecessary operations.

MARWIS.

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Lufft MARWIS-UMB Technical Data

Status May 2014

Complement the stationary monitoring network with dynamic (mobile) data. Automatic optimization of gritting material. Dynamic route optimization for winter maintenance operations. Real time thermal mapping.

Measurement principle (optical / spectroscopic): Water absorbs certain wavelength bands to varying degrees. When there is a layer of water on a roadway, the spectral properties change.

The road surface condition, for instance rain, black ice, slush or snow / slippery frost, as well as the dew point and road surface temperature are determined by this means.

Sensors are mounted on vehicles in accordance with the requirements for a road traffic meteorological monitoring network.

MARWIS for the detection of water, ice and snow as well as grip friction can be installed on vehicles with a distance of 1-2 meters between the measuring instrument and the object of measurement.

MARWIS delivers the following data:

- **Air temperature**
- **Relative humidity**
- **Dew point temperature**
- **Road conditions: dry, moist, wet, snow, ice**
- **Ice percentage**
- **Grip friction**

When the number of ice particles on the road surface increases, the friction coefficient falls and can thus serve as an important element of decision-making with regard to preventive gritting.

Due to the open interface protocols, MARWIS can be easily integrated into existing winter maintenance monitoring networks. Similarly, MARWIS can communicate directly with the control system on gritting vehicles.

The measurement data output supports the following protocols: UMB binary.

Lufft MARWIS mobile sensor			Order no.
- Determination of the road surface condition such as dry, wet, ice / snow and critical moisture		1 m meas.dist. to road surface	8900.U01
		2 m meas.dist. to road surface	8900.U02
- Determination of the dew point via built-in temperature / humidity sensor (plug-in)			
- Determination of the grip friction and ice percentage			
Technical Data	Dimensions	H. approx. 110 mm, W. approx. 200mm, D. approx. 100mm	
	Weight	1.5 kg	
Storage conditions	Permissible ambient temp.	-40°C ... 70°C	
	Permissible relative humidity	< 95% relative humidity, non-condensing	
Operating conditions	Operating voltage	10VDC...28VDC	
	Power consumption	approx. 3VA without heating, 50VA with heating	
	Permissible operating temp.	-40°C...60°C	
	Protection class	IP66	
Dew point temp.	Measuring range	-50°C...60°C	
Air temperature	Measuring range	-40°C...60°C	
	Accuracy	±0,2K@0°C	
	Resolution	0.1K	
Relative humidity	Measuring range	0...100%	
	Accuracy	±2%@10%...90%	
	Resolution	0.5%	
Road surface temperature	Principle	Pyrometer	
	Measuring range	-40 ... 70 °C	
	Accuracy	±0,8°C@0°C	
	Resolution	0.1 °C	
Road condition	Dry, moist, wet, ice, snow / ice, critical moisture		
	Grip friction, measuring range 0...1 (smooth ... dry)		
	Sampling rate, 100Hz		
Accessories	Vehicle bracket short (mounting for cars)		8900.G01
	Vehicle bracket long (mounting for trucks)		8900.G02
	iPad Mini		8900.IPAD
	Providing per year and MARWIS		8040.SVP
	Connection cable, 15 m including plug connector		8371.UK015
	Connection cable, 50 m including plug connector		8371.UK050
	Plug connector excluding cable		8371.UST1



The mobile sensor, which is sealed against dirt in a protective housing, measures 100 times per second and works reliably under extreme conditions.

There are hundreds of different types of asphalt for roads. Whether low-noise asphalt, porous asphalt, mastic asphalt or concrete, MARWIS automatically adjusts the recording of the conditions to the surface structure.



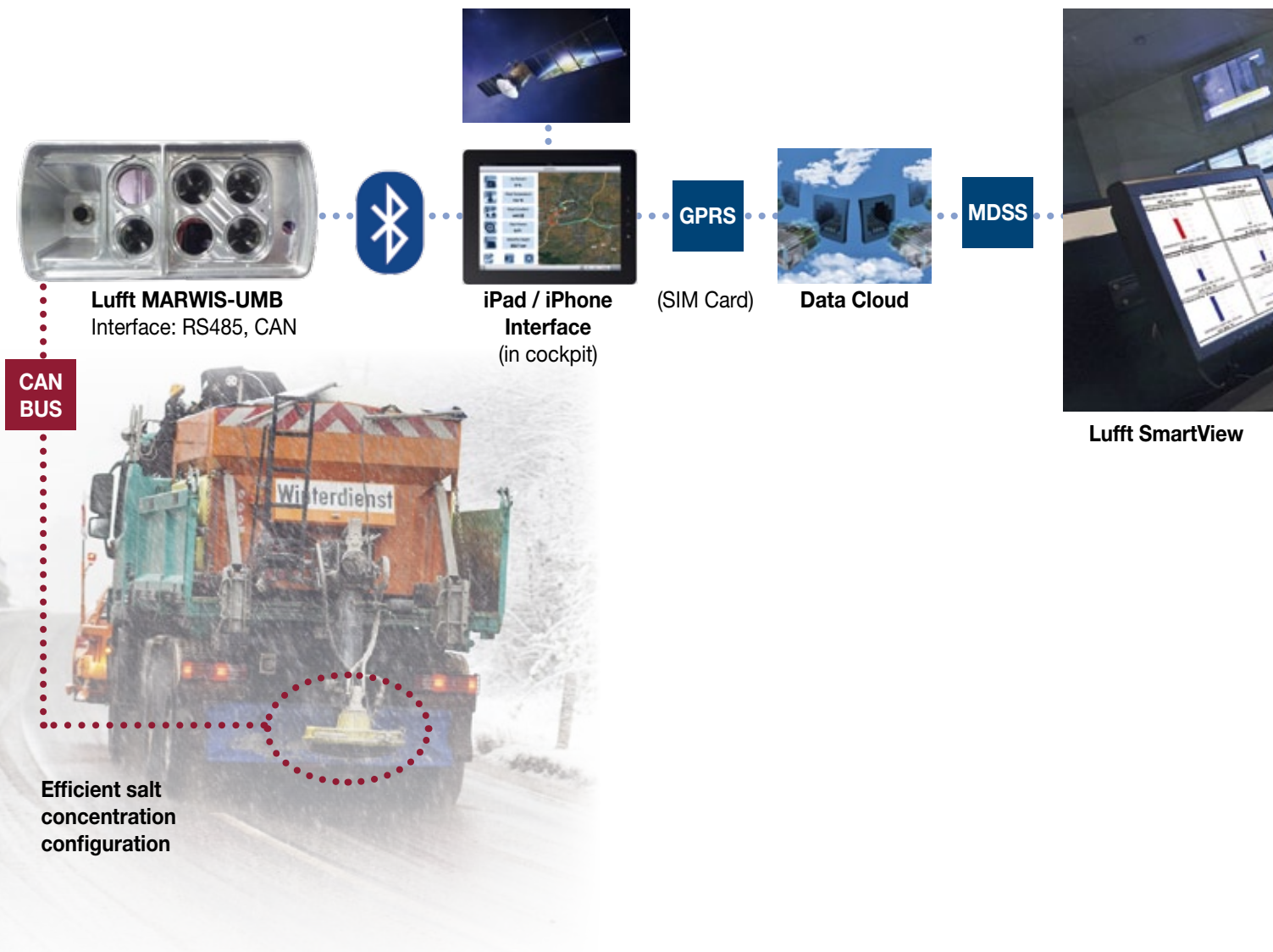
The specifications for mobile measurements are completely different to those for stationary sensors:

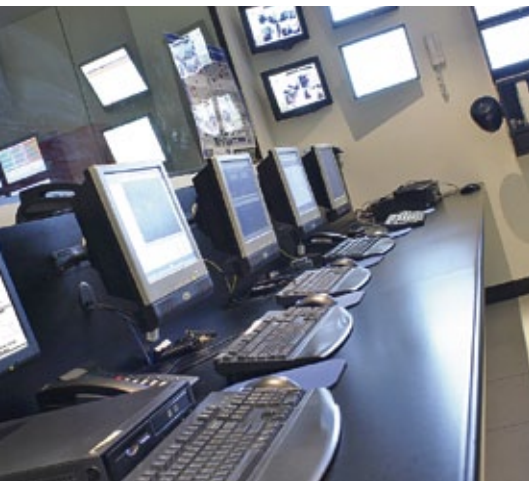
- Vibration of the vehicle must not distort the measured value
- Even on extremely dirty roads, the sensor must provide maintenance-free, reliable operation while driving
- The sensor must be removable from the housing, easily and quickly, for cleaning purposes
- The sensor must operate automatically with different surface materials (asphalt, concrete), without special calibration
- Damage and potholes in the road must not cause incorrect measurements (pre-processing of measured value in sensor)
- The sensor data must be transmitted to different interfaces (display and gritting controller) in parallel, both wirelessly (Bluetooth) and by cable (CAN bus)

MARWIS.

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Weather data in the vehicle and control center in real time.





In the control center, the data are displayed in SmartView3 in real time. Important: Past journeys from the archive can also be displayed with this software.



In the vehicle, an iPad or iPhone displays the measurement data graphically in real time.

MARWIS.

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